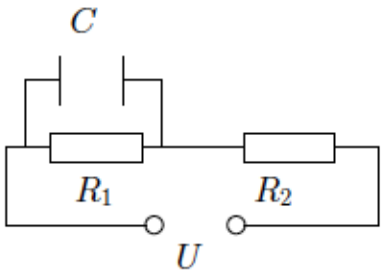
3. izpit iz Fizike II za študente Biokemije

17. september 2010

Naloge

1. Kolikšen naboj je shranjen na kondenzatorju s kapaciteto 1 pF, če sta upornosti uporov $R_1 = 1\ \Omega$ in $R_2 = 2\ \Omega$, skozi upornik R_2 pa teče električni tok 2 A? Kolikšna je gonilna napetost baterije?



2. V dno 3 m globokega jezera je navpično zabit drog tako, da vrh droga sega točno do gladine jezera. Po kolikšnim kotom glede na navpičnico padajo sončni žarki, če je dolžina sence droga na dnu jezera dolga 2 m? Lomni količnik vode je 1.33.

3. V vodi s temperaturo 20°C nastane na globini 2 m zračni mehurček s prostornino 1 cm^3. Ob nastanku je temperatura zraka v mehurčku enaka temperaturi vode. Kolikšna je temperatura zraka v mehurčku, ko se ta dvigne tik pod vodno gladino? Predpostavi, da se zrak v mehurčku pri dviganju razpenja adiabatno. Razmerje specifičnih toplot zraka pri konstantnem tlaku in prostornini je 1.4, zunanji zračni tlak je 1 bar, gostota vode pa 1000 kg/m^3.

Enačbe

$v = \frac{\mathrm{d}s}{\mathrm{d}t} \quad a = \frac{\mathrm{d}v}{\mathrm{d}t} \quad \omega = \frac{\mathrm{d}\varphi}{\mathrm{d}t} \quad \alpha = \frac{\mathrm{d}\omega}{\mathrm{d}t}$
$s = s_0 + vt \quad \varphi = \varphi_0 + \omega t$
$s = s_0 + v_0 t + \frac{1}{2}at^2 \quad v = v_0 + at \quad \varphi = \varphi_0 + \omega_0 t + \frac{1}{2}\alpha t^2 \quad \omega = \omega_0 + \alpha t$
$\omega = 2\pi\nu \quad v = \omega r \quad a_r = \frac{v^2}{r} \quad a_t = \alpha r$
$\vec{F} = m\vec{a} \quad \vec{M} = J\vec{\alpha} \quad \vec{M} = \vec{r} \times \vec{F}$
$F_\mathrm{g} = mg \quad F_\mathrm{vzm} = kx \quad F_\mathrm{lep} = k_\mathrm{lep}F_\mathrm{p} \quad F_\mathrm{tr} = k_\mathrm{tr}F_\mathrm{p}$
$J_\mathrm{valj} = \frac{1}{2}mr^2 \quad J_\mathrm{krogla} = \frac{2}{5}mr^2 \quad J_\mathrm{palica} = \frac{1}{12}ml^2 \quad J_\mathrm{točka} = mr^2 \quad J = J^* + mr^{*2}$
$\Delta W = A' \quad W_\mathrm{kin} = \frac{1}{2}mv^2 \quad W_\mathrm{pot} = mgh \quad W_\mathrm{pr} = \frac{1}{2}kx^2 \quad W_\mathrm{rot} = \frac{1}{2}J\omega^2 \quad A = \vec{F} \cdot \vec{s}$
$\Delta\vec{G} = \vec{F}\Delta t \quad \vec{G} = m\vec{v}$
$\Delta\vec{\Gamma} = \vec{M}\Delta t \quad \vec{\Gamma} = \vec{r} \times \vec{G} = J\vec{\omega}$
$\vec{r}^* = \frac{\sum_i m_i \vec{r}_i}{\sum_i m_i}$
$F_\mathrm{g} = \frac{Gm_1m_2}{r^2}$
$p = p_0 + \rho gh \quad p + \frac{1}{2}\rho v^2 + \rho gh = \mathrm{konst.}$
$F_\mathrm{vzg} = \rho V g$
$F_\mathrm{u} = \frac{1}{2}C_\mathrm{u}\rho S v^2 \quad F_\mathrm{u} = 6\pi\eta r v \quad \mathrm{Re} = \frac{l\rho v}{\eta}$
$t_0 = 2\pi\sqrt{\frac{l}{g}} \quad t_0 = 2\pi\sqrt{\frac{m}{k}} \quad s = s_0 \sin\omega t \quad \omega = 2\pi\nu = \frac{2\pi}{t_0}$
$c = \lambda\nu \quad c = \sqrt{\frac{F}{\rho S}} \quad s = s_0 \sin(kx - \omega t) \quad k = \frac{2\pi}{\lambda}$
$s_1 - s_2 = N\lambda \quad s_1 - s_2 = \left(N + \frac{1}{2}\right)\lambda \quad d\sin\alpha = N\lambda \quad d\sin\alpha = \left(N + \frac{1}{2}\right)\lambda$
$\frac{\Delta l}{l} = \frac{1}{E}\frac{F}{S} \quad \frac{\Delta l}{l} = \alpha\Delta T \quad \frac{\Delta V}{V} = \beta\Delta T \quad \beta = 3\alpha$
$pV = \frac{m}{M}RT \quad pV^\kappa = \mathrm{konst.} \quad \kappa = \frac{c_p}{c_V} \quad c_p = c_V + \frac{R}{M} \quad W_\mathrm{n} = mc_V T$
$\Delta W = A' + Q \quad A = -\int_{V_1}^{V_2} p\mathrm{d}V \quad Q = mc\Delta T \quad Q = C\Delta T \quad Q = mq_\mathrm{t} \quad Q = mq_\mathrm{i}$
$\eta = \frac{A_\mathrm{opr}}{Q_\mathrm{dov}} \quad \eta_\mathrm{C} = 1 - \frac{T_1}{T_2}$
$P = S\lambda\frac{\Delta T}{d}$
$\vec{F}_\mathrm{e} = e\vec{E} \quad F_\mathrm{e} = \frac{e_1e_2}{4\pi\varepsilon\varepsilon_0 d^2} \quad W_\mathrm{e} = eV \quad V = \frac{e}{4\pi\varepsilon\varepsilon_0 d}$
$E = \frac{\sigma}{2\varepsilon\varepsilon_0} \quad E = \frac{\sigma}{\varepsilon\varepsilon_0} \quad e = CU \quad C = \frac{\varepsilon\varepsilon_0 S}{d} \quad C = C_1 + C_2 \quad \frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2} \quad W_\mathrm{e} = \frac{e^2}{2C}$
$U = RI \quad R = \frac{\xi l}{S} \quad R = R_1 + R_2 \quad \frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} \quad P = UI$
$\mathbf{F} = I\mathbf{l} \times \mathbf{B} \quad B = \frac{\mu_0 I}{2\pi r} \quad B = \frac{\mu_0 NI}{l} \quad \mathbf{F} = e\mathbf{E} + e\mathbf{v} \times \mathbf{B} \quad \mathbf{M} = \mathbf{p}_m \times \mathbf{M} \quad \mathbf{p}_m = NI\mathbf{S}$
$U_i = -\frac{\mathrm{d}\Phi_m}{\mathrm{d}t} \quad \Phi_m = N\mathbf{S} \cdot \mathbf{B} \quad I_{ef} = \frac{I_0}{\sqrt{2}} \quad U_{ef} = \frac{U_0}{\sqrt{2}} \quad \bar{P} = I_{ef}U_{ef} \quad \omega = \frac{1}{\sqrt{LC}} \quad L = \frac{\mu_0 N^2 S}{l}$
$k_1 \sin\alpha = k_2 \sin\beta \quad \frac{1}{a} + \frac{1}{b} = \frac{1}{f} \quad \frac{h_1}{h_2} = \frac{a}{b}$